

## Tests

### Neurological exam and history

Because memory loss, behavioral disorders and other related problems are often complex, a comprehensive evaluation is necessary. At the UCSF Memory and Aging Center, patients undergo an extensive neurological, neuropsychological and nursing assessment that usually requires several hours. Information from the caregiver is sought in every case. The evaluation may require two to three visits to determine the cause of the symptoms and recommend treatment.

After the evaluation, the medical team involved with each patient meets to discuss the diagnosis and potential treatments. After this meeting, the team discusses its findings with the patient and the family. In some cases, a diagnosis will be deferred until more information from blood tests or brain imaging is collected.

### Neuroimaging

#### Structural scans

One of the most useful tests in the evaluation of FTD is magnetic resonance imaging (MRI). MRI uses magnetic fields and radio waves, without any X-rays, to produce images of the inside of your body. It is non-invasive and considered very safe, but some people with metal implants and cardiac pacemakers are unable to have MRI. Talk to your doctor or the imaging technician if you have any concerns about entering the magnet. Some people find lying in the scanner produces anxiety or claustrophobia because of the tube-like shape or the loud sounds during the scan. Sedation may be available to you if needed, but relaxation techniques like deep breathing, visualization and meditation can also help. Some MRI scanners allow you to listen to music or watch a movie. To get the best pictures, you need to be as still as possible while in the scanner.

FTD leads to loss of brain tissue that is visible on MRI scans of patients while patients are still alive. Different areas of the brain are affected (early on) by different types of FTD:

1. **FTD (frontal lobes):** responsible for personality, judgment and planning/organization
2. **SD (anterior temporal lobes):** store general information about the world, very important for language and face recognition, critical for understanding the emotions of others
3. **PNFA (left frontal lobe):** produces spoken language

A computed tomography (CT) scan is similar to the MRI but does not image brain structure with the fine precision of MR. A CT scan is an X-ray technique that produces cross-sectional images of the inside of your body or head. Typically scans last only a few minutes, during which time you should lie still. You may hear some whirring and clicking noises during this test, which is normal. In order to make the CT image, you will be briefly exposed to X-ray radiation, so be sure to discuss any concerns you have with your doctor.

## Functional scans

Functional scans, by single-photon emission computed tomography (SPECT), functional MRI (fMRI) or positron emission tomography (PET), typically demonstrate decreased activity in the frontal and temporal lobes. Amyloid imaging with PET can tell whether the patient is suffering from Alzheimer's disease, versus frontotemporal dementia. This is still experimental but can be obtained in some centers.

A SPECT scan shows how blood flows through arteries in the brain. A radioactive material (tracer) is injected into a vein in the arm, and then the scanner detects the movement of the tracer through the brain and computes the brain activity. Brain areas affected by FTD show diminished activity. As with any neuroimaging procedure, you will need to lie as still as possible so that the machine can obtain accurate pictures. After the scan, be sure to drink plenty of fluids. Most of the radioactive tracer leaves your body through your urine within a few hours after your SPECT scan. Talk to your doctor if you're concerned about your exposure to radiation during a SPECT scan.

Functional MRI is a special type of scan done in the MRI scanner. It shows changes in blood flow in the brain, which represent active areas of the brain using more or less blood to perform certain tasks. The experience and equipment is similar to that of a structural MRI scan.

PET scans show the activity of tissues by measuring the energy usage (metabolic activity) of your brain. Like a SPECT scan, PET combines a brain camera and a radioactive material (tracer). The tracer is what allows doctors to see how your body tissues absorb and use different chemicals in real time. 30-45 minutes prior to the scan, a tracer is injected into your bloodstream. Once the tracer has had time to reach your brain, you'll lie on a table that moves slowly through the scanner. By detecting metabolic changes in the brain, your doctor can see which areas are healthy versus dysfunctional. Be sure to remain as still as possible so that the machine can get accurate pictures. Depending on the information your doctor needs, you may be asked to perform certain tasks like read or speak to activate specific areas of your brain. Once the scan is complete, be sure to drink plenty of fluids to flush out any tracer left in your body.

## **Neuropsychology**

Neuropsychological testing is useful to obtain a clinical assessment of the disease. These tests evaluate conduct, language, visuospatial abilities, memory, abstraction, planning and mental control, motor skills and intelligence. Tests of the FTD patient may show visual and memory abilities intact. However, abstract thinking, word generation, motivation and ability to follow rules may be disrupted.

## **EEG**

An electroencephalogram (EEG) shows patterns of electrical activity produced by your brain as recorded by electrodes placed on your scalp. It is non-invasive and minimally uncomfortable (the electrodes may scratch or itch you and are held in place with a sticky paste). The electrodes do not generate any electricity; they only record electrical activity produced by your brain. You will need to be still with your eyes closed during the 20-40 minute recording in order to get a quality EEG.

In people with FTD, the electroencephalogram (EEG) is usually normal or shows mild frontal slowing. Thus, a normal EEG does not mean that the behavioral manifestations are primarily the result of a psychiatric illness.